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ABSTRACT

A study examined decisions involving private, postsecondary vocational schooling using three large, national sets of data (from the National Longitudinal Surveys) on males. Particular attention is paid to three target groups: inner-city and rural individuals and dropouts. Various equations were estimated using a life-cycle model of time allocation to market work, college, and vocational schooling. Empirical results indicate that persons who took very short programs in private vocational schools (less than three full-time-equivalent months) earn more than persons who didn't train but that this advantage decreases and eventually reverses for longer programs. Estimated dropout penalties are insignificant for all but inner-city youths. Dropout rates from private vocational schools are high, and dropping out appears to be an important method of choosing program length. Other results indicate that persons with poor socioeconomic backgrounds and high IQs take private vocational schooling. Also, during the time they attend private vocational schools, students get higher paying jobs than similiar non-trainees. Current governmental policies encourage much longer programs in private vocational schools than appear to be justified by this study. Inner city youths in particular should be encouraged to take and complete short programs, since their estimated dropout penalty is large. (Description of procedures, data preparation, and findings are included. A shorter executive summary is also available--see note.) (JT)

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Final Report

PROJECT No. 498AH60205
Grant No. G007603868

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AN EMPIRICAL STUDY OF DECISIONS INVOLVING POST-SECONDARY VOCATIONAL SCHOOL TRAINING

VOLUME II - TECHNICAL REPORT

March 1978

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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VOLUME II - TECHNICAL REPORT

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March 1978

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U.S. DEPARTMENT OF

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This study examines decisions involving private, post-secondary vocational schooling using three large, national sets of data on males. Particular attention is paid to three target groups--inner-city and rural individuals and dropouts. Various equations are estimated using a life-cycle model of time allocation to market work, college, and vocational schooling.

Empirical results indicate that persons who took very short programs in private vocational schools (less than three full-time-equivalent months) earn more than persons who didn't train but that this advantage decreases and eventually reverses for longer programs. Estimated dropout penalties are insignificant for all but inner-city youths. Dropout rates from private vocational schools are high, and dropping out appears to be an important method of choosing program length. Other results indicate that persons with poor socio-economic backgrounds and high IQ's take private vocational schooling. Also, during the time they attend private vocational schools, students get higher paying jobs than similar non-trainees.

Current governmental policies encourage much longer programs in private vocational schools than appear to be justified by this study. Inner-city youths in particular should be encouraged to take and complete short programs, since their estimated dropout penalty is large.

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CHAPTER 1

INTRODUCTION

The purpose of this project is to analyze how and why people choose to train in private, post-secondary vocational schools and to estimate the short- and long-term effects of this training. A secondary objective is to find any differences in decisions or benefits between completers and dropouts of these schools and between inner-city, rural and other youths.

The project uses three large, nationally representative data sources, combined with verbal input of persons having direct knowledge of the post-secondary training system, to increase understanding of the training decision process and indicate ways the process can be improved. Throughout the project, the close tie between decisions about private vocational schooling, college and work is explicitly modeled. The analysis applies to males only, since only one of the data sources has information on females.

The strongest finding of this project is summarized in the title of Chapter 2--"Dropping Out Can Pay . . ." Holding constant all available characteristics, the data show that persons who attended private vocational schools for very short periods (less than about three full-time months) generally earn wage rates significantly higher than those with no training. However, the wage premium is smaller the longer is the program and eventually (at about one year) it turns negative.

Except for inner-city youths the estimated penalty for dropping out of a vocational program prior to completion is insignificant, so the best course of action for most people enrolled in long private vocational programs is to drop out. Dropout rates for vocational schools are quite high

(around 40%) and there is some evidence implying that young men use dropping out as a kind of "second-best" method of choosing the length of their vocational school program.

Still, some youths appear to be taking "too much" training in private vocational schools, and the process of signing up and then dropping out is inefficient at best. High dropout rates are particularly problematic for inner-city youths, since they suffer a large, significant wage loss due to dropping out. Since inner-city youths are disadvantaged by definition, this dropout penalty can seriously hinder attempts to use skill formation to improve their circumstances. Therefore, one can make a strong case for providing potential students with accurate information and for encouraging them to sign up for short vocational school programs (both because short programs increase wages more and because dropout rates are positively correlated with the length of the program).

My results imply the importance of policies that differentially subsidize vocational school programs of different lengths, emphasizing completion of short programs as opposed to long programs or dropping out. Current government policy contains some differential subsidies but almost always in the wrong direction (e.g. most federal reimbursement has a 600 classroom hour minimum).

It should be made clear that my findings say not just that long vocational school programs are inadvisable but also that very short programs (less than three full-time months) can be quite profitable. For inner-city youths, I estimate that subsequent wage rates increase 20% for persons completing very short vocational school programs. Further, the private vocational schools are already an important source of skill formation for inner-city youths (enrolling 10% of them; only 5% go to college). Therefore,

it is likely that the vocational schools can serve as a significantly more important source of upward mobility for inner-city youths than they have in the past if these students take shorter programs and drop out of the programs less frequently.

Results estimated on a sample of men 45-59 years old show that effects of private vocational schooling persist many years after the training. They also indicate that the structure of returns to vocational schooling has changed over the years as these schools became less central in the post-secondary training system.

Equations fit to data on young men in and out of formal training show that attending private vocational schooling may increase wage rates in the periods with training. Combined with the result that self-reported net direct costs of full-time-equivalent schooling (i.e. tuition + room + board + transportation - aid) are lower for students in vocational schools than in 2- or 4- year colleges, this result implies that vocational school students self-finance much of their training costs by working. These findings help explain why relatively disadvantaged young men choose to do much of their training in private vocational schools.

Finally, my results show that the length of program chosen by vocational school students is more responsive to net direct costs than lengths in either 2- or 4-year colleges. This is fortunate because it implies that a program of differential subsidies might substantially improve the accuracy with which young men make decisions about training.

CHAPTER 2

DROPPING OUT CAN PAY: AN ANALYSIS OF RETURNS TO PRIVATE VOCATIONAL SCHOOLING*

I. Introduction

This study explores the returns to private, post-secondary vocational schooling compared to college. A large number of young people (10 percent in my sample of young men) attend private vocational schools, but they take very short programs (averaging about three-quarters of a full-time year). My previous work in this area (Olson 1975, 1977) uncovered an intriguing possible explanation for the short programs--negative marginal returns to training length.

This paper uses additional data, adds an indication of dropping out, provides separate estimates for inner-city youths and others, and employs a piecewise-linear specification to explore the finding of negative marginal returns.

Results in this paper support a negative marginal effect, concentrated in the first full-time year of training and perhaps stronger for inner-city youths than others. The estimated penalty for dropping out before the end of a program is large and statistically significant for inner-city youths but essentially zero for others. Except for inner-city youths, my results are consistent with the short length and the high dropout rates in private vocational schools both being due to the reaction of originally misinformed young men when they learn more about training returns.

Very short private vocational school programs can be attractive investments--increasing subsequent wage rates by about 20 percent for inner-city

completers, 11 percent for others whether or not they complete, but added length soon turns the total effect negative. Although costs are not available in my data, short vocational school programs probably dominate any college programs less than about 2-3 years long.

Therefore, unless all these results are due to biases of estimation (possible sources of bias are discussed in section III), it is important to direct young people toward short vocational or long college courses. Current government policy is doing precisely the opposite--pushing toward longer programs in private vocational schools and growth of two-year colleges. Results of these policies could be particularly unfavorable for inner-city youths who enroll in long vocational school courses, since their estimated dropout penalty on subsequent wage rates is 34 percent.

II. Behavioral Model and Data Description

This section contains a brief statement of the behavioral model underlying the estimating relations, a description of the data and definitions of variables.

The implicit behavioral model for this study involves life-cycle time allocation subject to a conditional wage equation. The model is described in Olson (1977) as follows:

> "Consider an individual at the end of secondary school and assume all functions and parameters relevant for decision making are known to him. The potential effects of his formal training and work are embedded in an age-dependent wage function and his market discount rate is fixed. His problem is to choose time allocation and spending for all subsequent periods (non-sequentially), subject to the wage function and a total spending constraint, in order to maximize lifetime utility." (p. 2)

First-order conditions for (positive) training in each period (and, therefore, in total) require that marginal training utility costs (the value of training time and of indirect effects of training on current wages) be equated with discounted utility returns. Under reasonable conditions, comparative statics results indicate that anything which increases training returns, reduces costs, or decreases the market discount rate will generally increase the amount of (total and per-period) training chosen. These results are as expected. Observe only that 1) This is a one-equation model; the conditional, age-interacted wage equation contains all useful information, and 2) Time allocation for all periods is determined simultaneously.

The present study examines post-school wage rates in order to compare returns to private vocational schooling and college, abstracting from costs and relaxing the assumption that people have perfect information about training effects.

Data for this study are the years 1966-1973 of the National Longitudinal Survey (NLS) of Work Experience of Young Men (Center for Human Resource Research 1976). Definitions and brief descriptions of the variables are presented in Table 1. Observe that private vocational training length, VOCYR, and college length, COLYR, are measured in similar units for comparability. The procedure used involves an assumption that wage rates are affected by the total amount of vocational school training or college ever taken, rather than the age or intensity at which it was accumulated. Since most vocational school training is part-time, measuring this training in college-year equivalents corrects a source of misspecification in all previous studies of returns to private vocational schooling known to me, except my own.

Coding and data preparation are described in Appendix 1. The following points should be emphasized:

1) For any year, t, $VOCYR_t$ is coded recursively as $VOCYR_t = VOCYR_{t-1} + (((VOC\ Months)_t/9)\cdot((VOC\ Hours/week)_t/40))$, with data on all vocational training prior to 1966 given in the 1966 survey.[1] As described in Appendix 1, it was necessary to impute values of $(VOC\ Months)_t$ in some years for some observations, using data on $(VOC\ Hours/week)_t$, $VOCYR_{t-1}$, etc. Further, the questionnaire design of the NLS introduced a downward bias in the number of persons reporting private vocational school training. The overall result is that my measure of VOCYR probably contains non-trivial errors of measurement, although it is almost surely superior to measures in previous studies, and

2) $COLYR_t$ is measured in integral years and encompasses a relatively heterogeneous mix of training (e.g., vocationally oriented two-year colleges). The latter problem is shared by many other studies, and estimates of college returns in this paper are intended mainly for comparison with vocational school estimates. If separation of types of college were possible, more precise comparisons could be made.

III. Empirical Results

My empirical results are detailed and analyzed in this section. Although techniques used are necessarily somewhat complex, findings are presented in a form that should be accessible to most readers.

The NLS of young men is a national probability sample with up to six internal periods of data for each of 5225 young men (14 to 24 in 1966). For this study, data are organized into a single, merged file of observations

for all periods, t, of respondents at least 18 years old who answered all surveys through year t and who are at least one year out of school (i.e., not enrolled as of the current or previous survey, $VOCYR_t = VOCYR_{t-1}$, and $COLYR_t = COLYR_{t-1}$). Observations where work hours are zero, where the variables used to compute WAGE are inconsistent (not all positive) or where the calculated WAGE is less than $.50 or more than $20 are dropped for that year. The resulting file contains 1212 observations for t = 67, 1368 for 68, 1447 for 69, 1468 for 70, 1632 for 71, and 1335 for 73 (of these observations 113, 132, 134, 137, 167, and 159 respectively have VOCYR > 0).[2]

Table 2 presents coefficients of the formal training variables from weighted least squares (WLS) estimates of four forms of the conditional wage equation. For these equations ln(WAGE) is assumed to be a linear function of the right-hand-side variables, an unobservable "person effect" and noise. With this specification WLS estimates are both consistent and efficient if the residuals are homoskedastic and uncorrelated with the regressors; ordinary least squares estimates are consistent but inefficient. The form of the WLS procedure is unaffected by the number of observations per respondent and whether there are gaps in the time periods covered.[3] Only the estimated coefficients of the formal training variables are reported. All variables from T to the end of Table 1 were included in each of the estimating relations, together with T-interactions of these variables except T, IC, and the $YEAR_t$ dummies. Equation 1 demonstrates the principal result, reported in Olson (1976, 1977), that motivated the current study: this method of separating marginal and average effects of vocational school yields a significantly positive coefficient on VOCDM, a significantly negative coefficient on VOCYR.[4]

III.I Training Returns for Inner City Youths

Equations 2 and 3 represent attempts to explore the system further and examine whether equation 1 adequately characterizes the conditional wage function. Since private vocational schools are mostly urban and serve a low socio-economic status clientele, equation 2 adds IC-interactions to test whether effects of vocational school and college differ between inner-city youths and others.[5] IC effects, calculated for each variable with IC = 1, are also presented. The only significant difference in coefficients for IC and non-IC students is on the dropout variable. Failure to complete a vocational program has essentially no effect for non-IC students, given the amount of vocational school training actually accumulated; for IC respondents it has a large, significant, negative effect (-.339). Other effects are substantially but not significantly different with every coefficient estimated as larger for inner-city students.

To facilitate understanding, estimated cumulative proportional effects of training on wage rates are graphed in Figure 1 for IC and non-IC dropouts and completers.[6] Note that costs are explicitly ignored, so, e.g., even though a non-IC student with VOCYR = 1 has the same wage rate as one with VOCYR = 0, he is clearly worse off if the training involves <u>any</u> net costs. The vocational school lines stop at two years for IC-students, three for others, since nearly all relevant training takes place within these bounds.

The results in equation 2 and Figure 1 imply that either college or vocational school can be very valuable to inner-city youths <u>if</u> they choose the type of training appropriate to the total quantity desired and <u>if</u> they complete any private vocational school courses taken. Ignoring costs and

assuming that measured effects reflect total true benefits, persons desiring small amounts of training (less than about 2/3 to 3/4 years) should attend vocational schools while persons seeking more extensive training should attend colleges. Adding costs would probably affect the location but not the existence of this crossover. In particular, tuition is generally higher in vocational schools than in colleges attended by most persons who stop with small COLYR, but estimates in my earlier study indicate that a year of current vocational school training increases current average wage rates by 18 percent versus 6.5 percent for college--about $.42 for vocational school students versus $.16 for college students (Olson 1977).

To the extent that the estimated parameters of equation 2 accurately characterize the conditional wage function for inner-city youths, they contain clear policy prescriptions. Inner-city youths seeking small total amounts of post-secondary training should be encouraged to enroll in short vocational school courses and to complete them. William Goddard, Executive Director of the National Association of Trade and Technical Schools, says that current federal and state policies are pushing toward "collegizing" and lengthening vocational school programs (e.g., most federal aid programs now have eligibility minimums of 600 class hours). There is also a move toward requiring publication of completion and placement data for private vocational schools. For the objective of increasing wage rates earned by inner-city youths, my results imply that more information could be very useful to prospective trainees (including information on the experience of dropouts). Lengthening courses and making them more complex could have unfavorable consequences, particularly since dropout rates increase sharply with program length, especially for inner-city students.

College also looks attractive for inner-city youths. Its estimated marginal ≃ average proportional effect on wages is about 12 percent. However, note that <u>if</u> they can complete short vocational school programs, such programs appear to dominate college courses less than about 2-3 years, considering the higher total costs of the college programs.

Table 3 contains observed frequencies at various lengths of vocational school and college for various groups together with means of training length and wage rates for those with positive training. Results imply that inner-city youths have some understanding of their options, although not of the dropout penalty. As large a proportion (.1) of inner-city youths as others attend private vocational schools and dropout rates are quite similar (.44 = 36/82 for inner-city youths, .37 = 200/760 for others). However, the mean VOCYR over positive values is only half as large for inner-city students, .34 versus .72, possibly indicating a response to the (insignificantly) negative estimated effect of IC•VOCYR. A far smaller proportion of inner-city youths than others attend college, .052 versus .222, and average accumulations are slightly smaller, 2.64 versus 2.98. Private vocational schools appear to be an important source of post-secondary training for inner city youths, enrolling twice as many of these youths as college, but there does seem to be a dropout problem.

III.2 Differences in Marginal Effects by Length

Equation 3 employs a piecewise-linear, spline specification which relaxes the restriction that the marginal effect of vocational school or college is independent of length. As the equation is specified, the interpretation of

each coefficient is the same as in equation 1 except that its range is restricted. For instance, the coefficient of VOC½1 indicates that, in the range ½ to 1 year, VOCYR decreases earned wage rates by 25 percent per year (for a maximum of ½ year). The total estimated effect of VOCYR = 1 is -.228 = (-.207 - .248)/2. Inner-city coefficients are not estimated separately, since there are too few inner-city students to give meaningful segmented estimates.

Results in equation 3 indicate that there are probably some differences in the marginal effects of training by length, although the estimated distributions of the coefficients for each training type have substantial overlap. The estimated dropout penalty is small and statistically insignificant; from equation 2 this effect is probably concentrated on inner-city youths.

To get a firmer understanding of vocational school effects, equation 4 presents estimates of the coefficients of equation 3 (with VOCDM omitted and COLYR not segmented) for only these respondents with VOCYR > 0. Results are entirely consistent with the estimated structure of equation 3. Equation 4 displays a result that was more prominent in the first-stage estimate of equation 3--concentration of the negative marginal returns in the second half year of vocational school training. The difference between the constant terms of equations 3 and 4 (.089) provides another estimate of the VOCDM coefficient, consistent with estimates in equations 1 and 3.

Figure 2 presents the results of equation 3 in a form analogous to Figure 1. Both the college and vocational school curves are initially

steeper than corresponding curves in Figure 1. The crossover comes sooner, although it still appears likely that short, completed vocational school courses dominate college courses less than 2-3 years, given relevant costs.

III.3 Possible Explanations for the Estimated Negative Marginal Effect

The result that vocational schooling has an initial positive effect but that marginal effects are non-positive seems strange, but various explanations are possible. For instance, consider two simple models of private vocational schooling 1) The schools do no training but act as sophisticated placement services for their students. The most productive youths (in some unmeasured dimension) are hired away first, followed by the next best and so on, and 2) The schools do train but in an effectively self-paced way. The most productive students learn the material and leave first and so on. The distinctive characteristic of these models is the idea that the unmeasurable "person effect" in the wage equation is negatively correlated with vocational school length, implying a negative bias on the estimated coefficient.[7]

Using either model, one can see that the insignificantly negative coefficients of VOCDROP could be a combination of a true negative effect due to dropping out plus a positive bias due to the more productive youths being "pulled" out. In particular, the high dropout rate in the second half year (.50 = 69/137, values from Table 3) may reflect a concentration of true (failure) dropouts from longer vocational school programs in the latter part of that segment.

Particularly for the first year of vocational training, it seems unlikely that biases account for the entire difference between negative estimated effects and sufficiently large positive effects to cover all costs. Therefore, one must try to understand why people systematically take "too much" training.

Proprietary schools have sometimes used high-pressure sales tactics and very short courses may not be profitable at "reasonable" tuition rates. In a one-time decision, students whose incomplete knowledge is augmented by biased information from the schools may err while still acting rationally. Some private vocational schools are short-lived, perhaps even fly-by-night, and such schools have little to lose from providing inaccurate information to prospective students. Others may not be aware of the form of returns. Government subsidy rules (e.g., the 600 classroom-hour minimum) can also induce students to take "too much" training.[8] Given inaccurate information at the start of a program, dropping out may be an appropriate response for non-IC students who learn that marginal returns are non-positive. Clearly, there may be room for better federal and state policy in this area.

The NLS lacks a detailed indication of the type of vocational program taken (they are characterized only by one-digit occupational classifications--professional, managerial, etc.). A detailed breakdown might reveal, say, that students with VOCYR between 3/4 and 1 are concentrated in the notorious computer courses that were popular in the late 60's and early 70's (see Wolman et al. 1972 and Wilms 1974 for indications of low returns to computer training in private vocational schools).

Either an increase in the ability of low productivity students to find employment or an increase in unmeasured fringe benefits could compensate for estimated negative marginal wage effects. My sample is confined to persons with positive hours of work (there is little useable data on non-participants) and lacks fringe benefit data, so these ideas cannot be tested directly.

A word about errors in variables is in order, VOCDM is probably measured with fair accuracy, given the procedures used, but VOCYR probably contains errors. Most errors involve mislocating a respondent within the

VOCYR > 0 range. Such errors cause bias in the estimates of VOCYR effects in equations 1 and 2, possibly but not necessarily toward zero. They also bias the segmented marginal effects toward equality, particularly since it is unlikely that I have segmented at the correct points. Therefore, at least for equations 3 and 4, my results would probably be stronger if VOCYR could be measured without error.

III.4. Analysis of Training Decisions

The final task for this section is a descriptive analysis of the decision to take some vocational schooling, of how much is taken, and of the decision to drop out. The first two decisions sound like a typical limited dependent variable problem. However, all methods I am aware of for handling this problem restrict the effect of each variable or some composite to have the same sign for the probability of a positive observation and for the amount in the positive range (e.g., see Tobin 1958 and Heckman 1977).

For the current problem it may be optimal to take vocational schooling but to stop with as little as possible, so the restriction is probably violated. Therefore, Table 4 contains estimates of a probit function for whether training was taken plus two functions fit on observations with VOCYR > 0--a WLS regression for VOCYR and a probit for VOCDROP. Coefficients of any probit function are determined only up to a common scale factor. So, although coefficient magnitudes are comparable within an estimated equation, comparisons between equations in Table 4 are confined to signs and significance levels.

In this restricted sense, equations 5 and 6 clearly represent different structures--the decisions about going and about how long to stay do not lie

along an "intensity index" continuum. However, comparing equations 6 and 7 it looks quite possible that the length decision is simply the obverse of the decision to drop out.[9]

Ceteris paribus, SECSCH increases the probability of going to a private vocational school and the amount taken, while decreasing the probability of dropping out. Persons with higher IQ's and nonwhites are less likely to attend, take short programs when they do attend and are more likely to drop out. Inner-city youths are more likely to go, take short programs when they go and may be less likely to drop out.

Coefficients of the year dummies are useful for determining trends; note that these coefficients are not cumulative. The negative but insignificant coefficients in equation 5 indicate that the probability of attending may have been smaller in the later sample years, especially around the decade end, than in 67. The positive but insignificant coefficients in equation 6 rise moderately, so programs may be lengthening. The negative and steadily rising coefficients of equation 7 indicate a secular fall in dropout rates, a hopeful sign if it is accurate for inner-city students.

Overall, my results imply that some persons are probably taking "too much" private vocational school training, although individuals who took small amounts of college might have been better off in short private vocational school programs. Looking again at Table 3, it is clear that most vocational school students do take very short programs. There are more observations in the range below ½ year than in both longer ranges and the fewest number are in the apparently worst zone, ½ to 1 year. More college students complete 3 or 4 years than stop with 1 or 2 although the number with just 1 year is

large, perhaps indicating a college dropout problem. Therefore, although some people appear to have made inappropriate choices, most seem to have chosen well. Even the non-IC vocational school dropouts may have made a correct "second-best" decision.

IV. Summary and Conclusions

In this study, returns to private, post-secondary vocational schooling are examined to test an earlier finding of negative marginal returns. Various forms of the wage function are estimated. The basic result--that initial vocational schooling increases wages but that marginal effects are negative--is insensitive to specification and may be stronger for inner-city youths (10 percent of my sample). A piecewise-linear form indicates a large initial effect and apparent concentration of negative marginal effects in the first full-time-equivalent year (particularly its second half). Results suggest that dropping out of private vocational school may be a rational response to increased understanding of returns. The estimated dropout penalty is large and significant for inner-city youths but essentially zero for others. Equations estimated on observations with some vocational school training support the idea that dropping out is an important means of choosing training length.

A variety of explanations for my results are offered. Selection and estimation biases may be present in estimates of the length effect and dropout penalty. However, the simple expedient of restricting the sample to observations with some vocational schooling uncovered no important structural differences. Students' inaccurate information about training returns and

biases in government subsidies can lead to "too much" vocational training. Increased fringe benefits or labor demand effects could compensate for zero or negative wage effects. Differences in the type of schools and/or programs at different lengths may be important. Overall, it seems unlikely that true marginal effects of private vocational schooling are sufficiently positive to cover all costs, although it is difficult to rationalize negative total effects.

Data problems limit the precision of policy prescriptions, although probably without affecting qualitative results. The sample is young (the oldest respondents are 31 in 1973), direct costs of vocational schooling are omitted, and neither the type of school or program is specified. Inability to distinguish between types of college is a serious problem. This omission removes an ideal chance to compare private vocational schools with their closest substitutes--vocationally oriented two-year colleges. However, this difficulty only affects comparisons, while my starkest results apply to private vocational schools in isolation. A few more years of data may be helpful, but precisely targeted prescriptions require more and richer data.

With the appropriate caveats, my results imply that short vocational school programs can be very valuable. The "V" shape of combined returns implies that college courses less than about 2-3 years and long vocational school programs are inappropriate.

Most young men in my data seem to have avoided these zones, some by dropping out of long vocational school programs. Improving the returns information available to prospective students should increase the accuracy

of their decisions. Current government policies and subsidies may be inducing inappropriate choices, especially for inner-city youths given their large estimated dropout penalty. Government-induced lengthening of vocational programs may cause dropout rates to rise and abort attempts by inner-city youths to use private vocational schooling to increase their wages.

If governments and private vocational schools concentrated on short programs, the outlook would be much brighter. Vocational students would no longer have to drop out to achieve their appropriate program length. Inner-city youths could escape the apparent no-win situation they face once enrolled in long private vocational programs.

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FOOTNOTES

*The body and Appendix 1 of this chapter comprise a paper written in December 1977 and slightly modified in March 1978. The December version was presented at workshops at Charles River Associates, Cambridge, Massachusetts, Temple University College of Education, and The Center for Human Resource Research, Ohio State University.

[1]40 hours is the best available estimate of total hours of classroom and homework time per week in U.S. colleges (Dole 1959). Note that, even if this figure is not completely accurate, most qualitative results are unaffected since VOCYR is still approximately adjusted to full-time equivalence.

[2]In Olson (1976) where similar procedures were used to drop observations from the 1966 - 1969 NLS data (except that respondents in school were included) I presented a table comparing means of the variables before and after drops for all reasons other than age. From this table, it appears that the restricted sample is reasonably representative of the NLS.

[3]See Olson, White, and Shefrin (1977) for more information on the WLS procedure used. Estimated correlations between successive residuals of the equations in Table 2 are about .5, supporting the use of WLS. I had originally planned to include T-interactions of the formal training variables, so the first-stage parameters and residual correlations of equations 1-3 were estimated with these interactions included. However, t-statistics on these terms were small in all final equations. Therefore, the reported equations restrict the coefficients on these interactions to be zero. It was necessary to reestimate the first stage

since addition of irrelevant variables does not affect the consistency of the estimated residual correlations. I also tried entering predicted hours in the current period into the equations to pick up any dependence of wage rates on current hours worked. No evidence of dependence was found.

[4]In Olson (1977), this result held only for young respondents. Freeman (1974) found positive effects of vocational school length but his equations omitted the dummy variables for training, thereby restricting marginal and average effects to be equal.

[5]About 10 percent of the respondents in my sample are inner-city. Half the inner-city respondents are nonwhite, but three-quarters of the nonwhites are not inner city so inner-city and racial classifications differ. The NLS deliberately oversampled nonwhites; my sample is 28 percent nonwhite.

[6]In this instance and subsequently, estimated coefficients are used as the best available point estimates of the true effects, whether or not the coefficients are statistically significant. No useful indicator of whether college students dropped out is available, and the distinction between dropping out and stopping with less than four (or two) years is unclear in principle.

[7]See Hausman (forthcoming 1978) for a demonstration that biases due to correlation of person effects with regressors do arise in estimated systems similar to mine. In principle, one could estimate equation 3 in differenced form and see how coefficients of the vocational school variables changed. However, previous attempts to estimate schooling effects on differenced data

from the NLS have not been particuarly successful (e.g., see Lazear 1977 and discussion of some of his results in Olson 1977). Difficulties arise because of the essential simultaneity of formal and on-the-job training, which makes it unlikely that wage rates shortly before, during, or shortly after formal training accurately index time value. The current study overcomes this problem by including respondents as old as 31 (in 1973) and restricting to respondents at least a year out of school. With a few more years of the NLS, it may be possible to get useful results from carefully specified differenced equations. My equation 4 provides some support for the specification used here. Its coefficients imply no important structural differences between vocational school students and others.

[8]Wolman et al. (1972) found that a number of private vocational schools listed in local telephone directories could not be located. However, Goddard insists that the proportion of students enrolled in the short-lived proprietary schools is small and decreasing and that most schools have now stopped using pressure sales tactics. Many private vocational schools have recently lengthened four-month programs to six months in response to federal aid policies.

[9]The coefficients of equation 6 may not be consistently estimated, since truncation ensures positive mean errors at small quantitites. However, available methods for solving this problem don't make sense when, heuristically, the intensity index may kink at zero and bend back on itself. I did attempt to use Heckman's method anyway, but the resulting coefficient estimates for equation 5 were extremely unstable.

TABLE 1

DEFINITIONS OF VARIABLES

WAGE	(Total Wage & Salary earnings + Farm Earnings)/ ((Average Hours/Week)·(Weeks Worked)) in 1967 dollars.
VOCYR	Total time ever allocated to private vocational school training in college-year equivalents (40 hours per week, 9 months per year).
VOCDM	1 if respondent ever attended private vocational school, 0 otherwise.

	VOCYR = 0	0 < VOCYR ≤ .5	.5 < VOCYR ≤ 1	VOCYR > 1
VOC0½	0	VOCYR	.5	.5
VOC½1	0	0	VOCYR-.5	.5
VOC1+	0	0	0	VOCYR-1

VOCDROP	1 if respondent ever indicated dropping out of vocational school, 0 otherwise.
COLYR	(Years of completed schooling) - 12. ≥ 0.
COLDM	1 if respondent ever attended college, 0 otherwise.

	COLYR = 0	COLYR = 1	COLYR = 2,3	COLYR ≥ 4
COL1	0	1	1	1
COL23	0	0	COLYR-1	2
COL4+	0	0	0	COLYR-3

T	Years since respondent left secondary school in deviations from sample mean, 5.5.
IC	Inner-city. 1 if respondent lived in central city of SMSA at age 14 and has SES* < 10, 0 otherwise.
AEXP	Actual civilian work experience ≃ total hours ever worked/2000.
SECSCH	Years of completed schooling ≤ 12.
MARRIED	1 if married and living with spouse as of previous survey, 0 otherwise.
SOUTH	1 if resided in South as of previous survey, 0 otherwise.
MOTHED	Mother's years of completed schooling.
IQ	Standardized IQ score.
NONWHITE	1 if nonwhite, 0 otherwise.
YEARt	1 if year = t (t = 67, 68, 69, 70, 71, 73), 0 otherwise.

*A socio-economic status variable was provided in the data based on father's occupation, father's, mother's and oldest sibling's education, and availability of reading material in the home. The global mean is 10.

TABLE 2

COEFFICIENTS OF FORMAL TRAINING VARIABLES FROM WEIGHTED LEAST SQUARES REGRESSIONS. DEPENDENT VARIABLE = Ln(WAGE), 8462 Observations. (Absolute Value of Asymptotic t-statistics in Parentheses)

Universe	All Observations				Observations with VOCYR > 0
	Equation 1	Equation 2	Inner-City Effects	Equation 3	Equation 4
VOCDM	.116 (3.85)	.110 (3.46)	.195	.146 (3.94)	
VOCYR	-.104 (4.11)	-.106 (4.09)	-.133		
VOC0½				-.207 (1.36)	-.158 (.92)
VOC½1				-.248 (1.50)	-.340 (2.06)
VOC1+				-.0076 (.15)	.020 (.41)
VOCDROP	-.034 (.77)	-.00038 (.01)	-.339	-.033 (.74)	-.061 (1.34)
IC•VOCDM		.085 (.84)			
IC•VOCYR		-.027 (.23)			
IC•VOCDROP		-.339 (2.26)			
COLDM	-.0063 (.23)	-.0086 (.31)	-.013	.022 (.55)	-.067 (.96)
COLYR	.069 (8.08)	.068 (7.88)	.124		.067 (2.26)
COLI				.131 (3.05)	
COL23				.031 (1.23)	
COL4+				.078 (2.88)	
IC•COLDM		-.0048 (.04)			
IC•COLYR		.059 (1.26)			

TABLE 3

DATA ON VOCYR, COLYR, AND WAGE FOR VARIOUS GROUPS (Each Cell Contains Frequency and Proportion of N)

	N	VOCYR=0		VOCYR>0		0<VOCYR≤.5		.5<VOCYR≤1		VOCYR>1		Means over observations with VOCYR>0	
												VOCYR	WAGE*
All Observations	8462†	7620	.900	842	.100	490	.058	137	.016	215	.025	.718	3.21
IC = 1	807	725	.898	82	.102	66	.082	12	.015	4	.005	.341	3.22
IC = 0	7655	6895	.901	760	.099	424	.055	125	.016	211	.028	.759	3.21
NONWHITE = 1	2331	2234	.958	97	.042	84	.036	3	.001	10	.004	.343	2.39
IC = 1 & NONWHITE = 0	405	350	.864	55	.136	42	.104	12	.030	1	.002	.337	3.61
IC = 1 & NONWHITE = 1	402	375	.933	27	.067	24	.060	0	0	3	.007	.349	2.41
IC = 0 & NONWHITE = 1	1929	1859	.964	70	.036	60	.031	3	.002	7	.004	.340	2.38
VOCDROP = 1	331	22	.066	309	.934	188	.570	69	.208	52	.157	.618	3.00
VOCDROP = 1 & IC = 0	295	15	.051	280	.949	165	.559	63	.214	52	.176	.655	3.03
VOCDROP = 1 & IC = 1	36	7	.194	29	.806	23	.639	6	.167	0	0	.268	2.75

	N	COLYR=0		COLYR>0		COLYR=1		COLYR=2		COLYR=3		COLYR≥4		Means over observations with COLYR>0	
														COLYR	WAGE
All Observations	8462	6722	.794	1740	.206	502	.059	283	.033	130	.015	825	.097	2.97	3.76
IC = 1	807	765	.948	42	.052	14	.017	8	.010	2	.002	18	.022	2.64	3.63
IC = 0	7655	5957	.778	1698	.222	488	.064	275	.036	128	.017	807	.105	2.98	3.77
NONWHITE = 1	2331	2143	.919	188	.081	50	.021	40	.017	13	.006	85	.036	2.80	3.15
IC & NONWHITE = 0	405	381	.941	24	.059	8	.020	1	.002	0	0	15	.037	3.04	4.03
IC = 1 & NONWHITE = 1	402	384	.955	18	.045	6	.015	7	.017	2	.005	3	.007	2.11	3.08
IC = 0 & NONWHITE = 1	1929	1759	.912	170	.088	44	.023	33	.017	11	.006	82	.043	2.87	3.15

*The mean WAGE over observations with VOCYR = COLYR = 0 is 2.56.

†These represent 2522 different respondents.

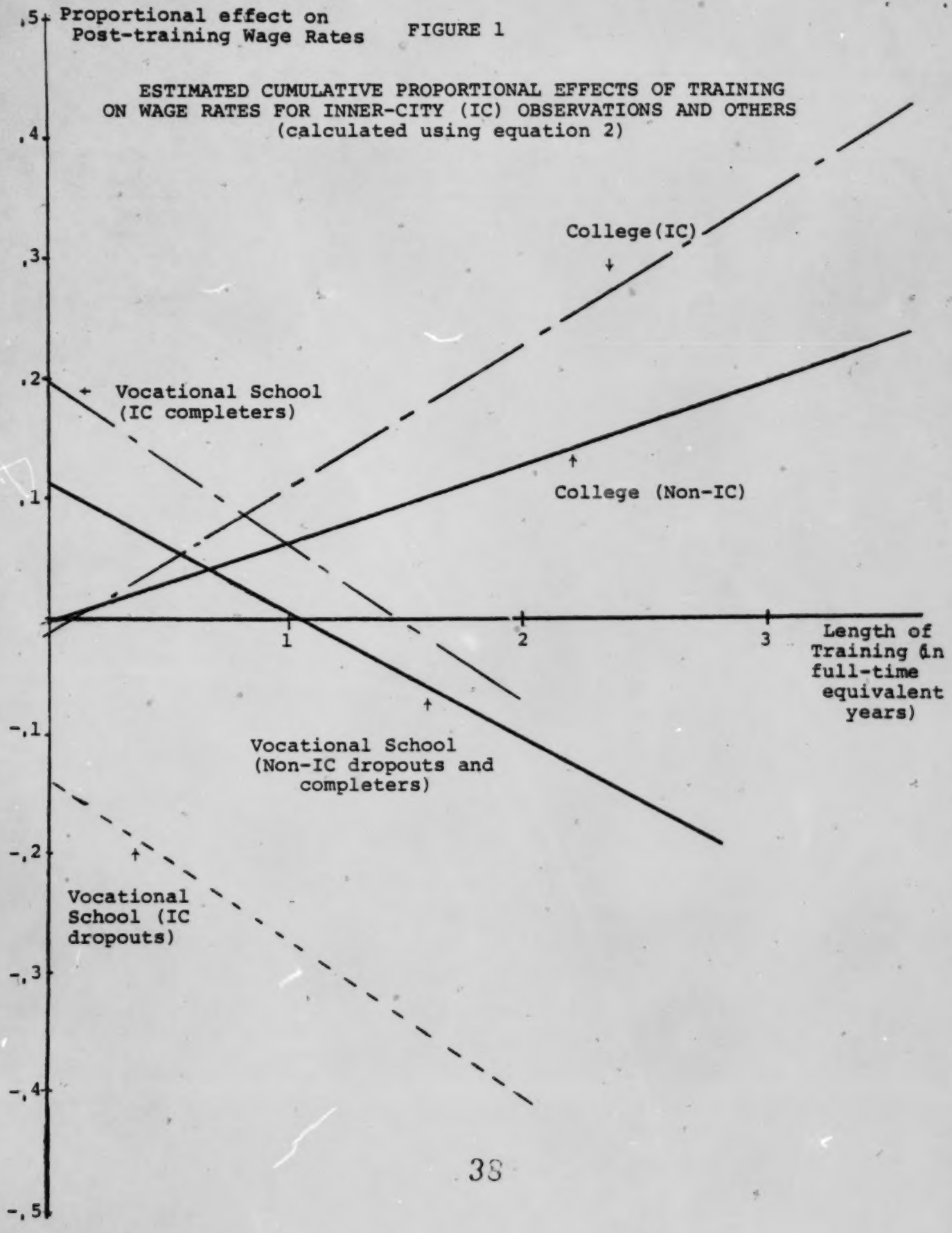
TABLE 4

PROBIT AND REGRESSION RESULTS ON VOCATIONAL SCHOOL DECISIONS
(Absolute Value of Asymptotic t-Statistics in Parentheses)

Universe	All Observations	Observations with VOCYR > 0	
	Equation 5 Probit Function 1 if VOCYR > 0 0 if VOCYR = 0	Equation 6 WLS Regression Dependent Variable = VOCYR	Equation 7 Probit Function 1 if VOCDROP = 1 0 if VOCDROP = 0
CONSTANT	-2.521	.879	.849
SECSCH	.142 (9.30)	.036 (1.40)	-.130 (3.43)
MARRIED	.039 (.89)	.013 (.97)	-.064 (.63)
SOUTH	.054 (1.24)	-.038 (1.06)	-.121 (1.16)
MOTHED	-.0035 (.47)	.0094 (.85)	-.020 (1.18)
IQ	-.0028 (1.72)	-.0068 (2.41)	.0076 (1.70)
NONWHITE	-.465 (8.07)	-.320 (3.54)	.359 (2.33)
IC	.197 (2.89)	-.190 (1.80)	-.163 (1.03)
T	.062 (8.31)	-.0061 (.89)	-.0063 (.34)
YEAR68	-.026 (.36)	.014 (1.09)	-.038 (.23)
YEAR69	-.079 (1.11)	.013 (.75)	-.080 (.49)
YEAR70	-.111 (1.56)	.027 (1.15)	-.181 (1.08)
YEAR71	-.094 (1.36)	.033 (1.13)	-.240 (1.81)
YEAR73	-.058 (.80)	.038 (1.06)	-.404 (2.40)

FIGURE 1

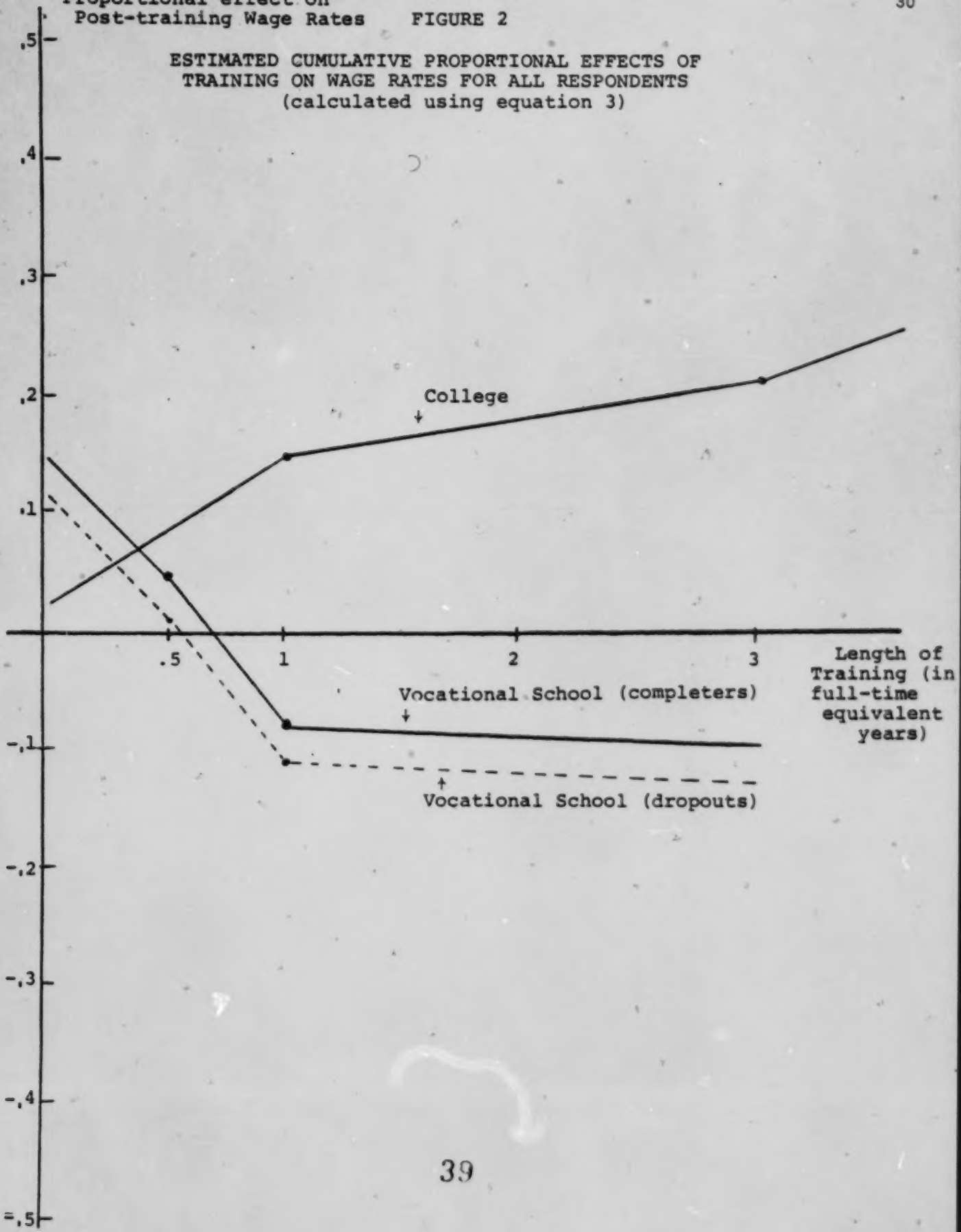
ESTIMATED CUMULATIVE PROPORTIONAL EFFECTS OF TRAINING ON WAGE RATES FOR INNER-CITY (IC) OBSERVATIONS AND OTHERS (calculated using equation 2)



Proportional effect on Post-training Wage Rates

FIGURE 2

ESTIMATED CUMULATIVE PROPORTIONAL EFFECTS OF TRAINING ON WAGE RATES FOR ALL RESPONDENTS (calculated using equation 3)



APPENDIX 1

PREPARATION OF THE DATA

Methods used to handle problems with the NLS data are described in this appendix.

As stated in the body of the paper, $VOCYR_t$ was coded recursively as

$$VOCYR_t = VOCYR_{t-1} + (((VOC\ Months)_t/9)\cdot((VOC\ Hours/week)_t/40)).$$

However, data on $(VOC\ Months)_t$ was sometimes missing for individuals who obviously had attended private vocational schools between the year t-1 and year t surveys. In these cases, $(VOC\ Months)_t$ was imputed using the following two regressions:

A) In years 70 and 71, $(Training\ Months)_t$, where "training" includes training in vocational schools, company training programs, etc., was not coded in the NLS for respondents currently in training as of the survey. For these observations I imputed $(Training\ Months)_t$ using a regression of $(Training\ Months)_t$ on $DVOC_t$, $(Training\ Years + VOCYR)_{t-1}$, $(Training\ Hours/week)_t$, $(Training\ Hours/week)_t \cdot DVOC_t$, $(Years\ of\ Schooling)_t$, $SMSA_t$ and $YEAR_t$, where $DVOC_t = 1$ if the training was in a vocational school, 0 otherwise; $SMSA_t = 1$ if the respondent lived in an SMSA, 0 otherwise; and $YEAR_t = 67, 68, 69$. This regression was then used to impute $(VOC\ Months)_t$ as the product of imputed $(Training\ Months)_t$ and actual $DVOC_t$. Approximately half the respondents with $(VOC\ Months)_t > 0$ in any year were currently in training as of the year t survey.

B) $(VOC\ Months)_t$ was sometimes missing in years other than 70 and 71 (and in 70 and 71 when training was not current) although $(VOC\ Hours/week)_t$ was positive. For these observations, $(VOC\ Months)_t$ was imputed from a regression of $(VOC\ Months)_t$ on $(VOCYR)_{t-1}$, $(VOC\ Hours/week)_t$, and $YEAR_t$. Approximately

10 percent of observations in years other than 70 and 71 have positive $(\text{VOC Hours/week})_t$ but missing data on $(\text{VOC Months})_t$.

Regression A was computed by OLS using all observations in years 67-69 with respondents currently in training at survey time, at least eighteen years old, answering all surveys up to and including year t, and with positive (non-imputed) values of both the dependent variable and $(\text{Training Hours/week})_t$. Regression B was computed on a similar subsample except that the current training restriction was dropped and both $(\text{VOC Months})_t$ and $(\text{VOC Hours/week})_t$ had to be positive.

VOCYR_t was coded in four stages--initial coding, regressing on the complete observations, recoding using the newly imputed values of $(\text{VOC Months})_t$, and imposing the restriction that $\text{VOCYR}_t \leq 2 \cdot (\text{Age}-18)$. The final restriction was imposed to keep a very few large values from dominating.

There were two other problems with the data used to create VOCYR_t. Except in 1973, $(\text{VOC Hours/week})_t$ was coded in categories in the NLS, the largest of which was twenty-plus. Closed-interval categories were recoded as their medians. The twenty-plus category was recoded as the mean of values of $(\text{VOC Hours/week})_{73}$ exceeding 20, viz. 37.34. Also, there was a built-in bias in the questionnaire, because respondents who were college graduates or currently in college as of the year t survey were not asked the vocational training questions.

Given the problems encountered with its input data, the measure of VOCYR_t used in this study obviously contains non-trivial coding errors. It is almost surely preferable to measures used in previous studies (where part- and full-time training were not distinguished), but the use of regressions A and B to impute values may require some justification. Failure to impute would have involved discarding information, since in all cases some real data were available. Further, persons taking vocational school in one period often take it in

adjacent periods. Since $VOCYR_t$ is computed recursively, failure to impute would have necessitated throwing away substantial amounts of complete data in other years.

Civilian work experience was coded to approximate total hours ever worked divided by 2000 (50 weeks of 40 hours). $AEXP_{66}$ was calculated as $AEXP_{66} = Age_{66}$ - (age last in school)$_t$ + .5 (length of previous educational interruption) + (years at last job in high school)$\cdot$(hours/week)/40 - (weeks unemployed + weeks out of labor force in 66/)52 subject to $0 \leq AEXP_{66} \leq (Age_{66} - 16)$. Then, if the respondent was out of school at the time of the 1966 survey and $AEXP_{66} = 0$, $AEXP_{66}$ was set to ½. $AEXP_{66}$ was then set to the larger of its calculated value and (weeks worked in 66)/52. Subsequent years were coded recursively as $AEXP_t = AEXP_{t-1}$ + ((usual hours/week)$_t \cdot$(weeks worked)$_t$).

Missing values of IQ and MOTHED were set to the global means, and missing data in the variables used to code MARRIED, SOUTH, and IC resulted in an output variable coded as zero.

It should be emphasized that all studies using large data sources like the NLS require the researcher to make judgments regarding missing and/or miscoded data. Procedures were chosen to try to preserve meaningful data, especially on vocational school training, and to do so in as simple and accessible a manner as possible. I believe that the procedures used introduce nc important avoidable biases into the estimating relations.

APPENDIX 2

ADDITIONAL RESULTS ON RETURNS

In this appendix, I discuss some further returns results from the NLS of young men and from the companion NLS of men 45-59 in the first survey year. Effects for respondents raised in rural areas and for older men are examined to aid understanding of the returns to private vocational schooling and college.

Table 5 essentially reproduces Table 2 but with the addition of RURAL (a variable that is unity if the respondent lived in a rural area at age 14, zero otherwise -- 18 percent of the sample is rural) and its interactions. Also added are T-interactions of RURAL and IC. None of the RURAL interactions is statistically significant, indicating that proportional wage effects of training are not significantly different between rural and other non-IC young men. Further, the "rural effects", calculated in the same manner as inner-city effects, are very similar to the coefficients for non-IC respondents. The equations in Table 5 are entirely consistent with these in Table 2, again indicating the stability of the system. Equations 3 and 4 are specified with VOCDM and VOCDROP interacted with IC and RURAL. As expected, the entire negative effect of dropping out falls on inner-city students.

Therefore, for proportional wage effects, rural students are basically indistinguishable from other non-IC students. However, the level and rate of increase in their wage rates <u>are</u> different. Coefficients of RURAL and T·RURAL are not reported in Table 5 but, in general, my estimates indicate that rural respondents earn about 10 percent less at T = 0 (highly significant) and that their wages grow about ½ percent less rapidly per year (significant only at about the 15 percent level) than others. If the level difference does not

reflect differences in current cost of living (current location is not held constant in these equations) or if the wage growth difference is real, special efforts to encourage training of rural youths may be justified.

Guidelines for any special attempt to promote training of rural youths would be the same as those for other non-IC students. The overall "V" shape of returns implies reliance on short programs in private vocational schools or long programs in colleges. Dropping out of private vocational school seems relatively benign for rural students, so the cost of signing up for long vocational school programs may be small as long as students realize the form of returns in time to drop out.

While there are no clear rural effects on proportional returns, differences in costs or tastes might lead to significant differences in training decisions. Therefore, Table 6 essentially duplicates Table 4 in the chapter but with RURAL added as an independent variable. None of the RURAL effects in Table 6 is statistically significant, implying that the training decisions of rural youths are similar to those of other non-IC respondents. The coefficients are very consistent with these in Table 4, another indication that the system is stable.

As yet another check of the results in Table 6 I calculated the proportions of rural respondents going to vocational school (.098); their mean program length (.765 years), dropout rate (.347), proportion attending college (.120) and mean college length (2.713 years). Except for the smaller proportion attending college, (.120 versus .222) these values are all close to those for non-IC respondents (reported in Table 3).

Therefore, vocational school may be a somewhat more important source of skill formation for rural respondents than for other non-IC youths, but all

evidence points to otherwise similar decisions. None of the findings in the chapter is changed substantially by the data on rural effects. However, if a special attempt to induce more training by rural youths is contemplated, the attempt may allow specific use of the findings of this study. Rural youths should be steered toward short programs in private vocational schools or long programs in colleges in order to achieve the maximum benefit.

Table 7 presents estimated formal training coefficients of two log-wage equations run on the older men's NLS data. Definitions of variables are essentially as before, except that IC and RURAL relate to age 15 (IC = 1 if the respondent lived inside a city of at least 25,000 at age 15 and the education of his household head at that time was below the sample mean, 7 years), the parent's education variable relates to the household head at age 15, no IQ variable is available, and secondary school is assumed to have ended at 18 for all respondents. The equations are estimated by ordinary least squares on 1966 data. Observations are dropped if schooling or the variables used to compute the average wage rate are unavailable. Since the data give no indication of hours of vocational school training, reported years of vocational school are multiplied by the ratio of average vocational school hours from the younger sample (22.74) to forty. This procedure surely introduces an error in the measurement of vocational school length, so no piecewise linear specification is estimated. Finally, the reported equations are estimated without T-interactions of the variables (estimates with these interactions were very similar).

It is clear from Table 7 that effects of training are quite different for the older men -- particularly effects of vocational school training - as compared to the younger men. At least for non-IC, non-rural men, the effect

of vocational school length on wage rates appears to be mildly positive. This difference could reflect either a difference in the age-specific effect of training or changes in the structure of post-secondary education.

Although, in principle, one cannot disentangle these alternative hypotheses, my belief is that the difference is mainly due to structural changes, notably in the relative importance of private vocational schooling in post-secondary education. Nearly as high a proportion of the older men attended private vocational schools as colleges (.15 versus .17), and they took longer programs than the younger men (averaging 1.1 years, a value that is biased downward if the average weekly training hours were longer for the older men). Therefore, it is not at all clear that the estimated coefficients in Table 7 are relevant for current decisions. Rather, they seem to tell something about the history of post-secondary training.

Even in this light, there are a few interesting things about the results in Table 7. The negative dropout effect for inner-city men is much smaller for the older men and not statistically significant, presumably because inner-city people in that age group were more in the mainstream of the population. Although not statistically significant, the estimated positive effect of dropping out of vocational school for rural men (.259) is also intriguing. Perhaps dropping out helped rural men to get jobs in the cities. Finally, in view of the folklore that effects of vocational training depreciate and obsolesce, it is interesting that positive effects remain for men in their forties and fifties. If the structural changes since the time when these men took their training (unknown but presumably 20 or 30 years before 1966) are not too large, this result indicates optimism that current positive effects will persist.

Summarizing the evidence on returns, it appears likely that many people are currently taking systematically too long programs in private vocational schools and too short programs in colleges. This evidence is strong and consistent for all estimates on the young men's data, but it is potentially contradicted by the results using the older men's data. Since the younger men are all less than 32 years old, this difference indicates that additional years of the younger men's NLS may change the policy prescriptions of the current study. I consider an outright reversal very unlikely, so my policy prescriptions in this report will assume that the returns to vocational school length are not sufficiently positive to overcome all costs. Therefore, I will advocate reliance on short programs in private vocational schools.

TABLE 5

COEFFICIENTS OF FORMAL TRAINING VARIABLES FROM WEIGHTED LEAST SQUARES REGRESSIONS (WITH RURAL INTERACTIONS). DEPENDENT VARIABLE = Ln(WAGE). 8462 Observations. (Absolute Value of Asymptotic t-Statistics in Parentheses)

	All Observations							Observations with VOCYR > 0		
Universe	Equation A1	Equation A2	Inner City Effects	Rural Effects	Equation A3	Inner City Effects	Rural Effects	Equation A4	Inner City Effects	Rural Effects
VOCDM	.102	.069			.092					
	(3.74)	(1.89)	.178	.136	(2.27)	.182	.179			
VOCYR	- .089	- .093								
	(4.07)	(3.33)	- .132	- .083						
VOC½					- .139			- .101		
					(1.01)			(.67))		
VOC½1					- .316			- .394		
					(2.18)			(2.75))		
VOC1+					.010			.028		
					(.24)			(.68))		
VOCDROP	- .038	- .0018			- .0023			.0085		
	(1.00)	(.04)	-.314	-.017	(.05)	-.323	-.017	(.16))	-.412	-.050
IC·VOCDM		.109			.090					
		(1.19)			(1.12)					
IC·VOCYR		- .039								
		(.38)								
IC·VOCDROP		- .312			- .321			- .429		
		(2.37)			(2.48)			(3.2)		
RURAL·VOCDM		.067			.087					
		(1.15)			(1.76)					
RURAL·VOCYR		.0097								
		(.20)								
RURAL·VOCDROP		- .015			- .015			- .058		
		(.18)			(.18)			(.71)		
COLDM	- .017	- .006			- .029			- .083		
	(.74)	(.22)	-.024	-.071	(.79)			(1.30)		
COLYR	.062	.057						.065		
	(8.23)	(6.76)	.114	.078				(2.42)		
COLI					.109					
					(2.78)					
COL23					.040					
					(1.83)					
COL4+					.061					
					(2.56)					
IC·COLDM		- .018								
		(.18)								
IC·COLYR		.057								
		(1.37)								
RURAL·COLDM		- .065								
		(1.18)								
RURAL·COLYR		.021								
		(1.24)								

TABLE 6

PROBIT AND REGRESSION RESULTS ON VOCATIONAL SCHOOL DECISIONS (WITH RURAL EFFECTS)
(Absolute Values of t-statistics in Parentheses)

Universe	All Observations	Observations with VOCYR > 0	
	Equation A5 Probit Function 1 if VOCYR > 0 0 if VOCYR = 0	Equation A6 WLS Regression Dependent Variable = VOCYR	Equation A7 Probit Function 1 if VOCDROP = 1 0 if VOCDROP = 0
CONSTANT	-2.551	.974	.866
SECSCH	.142 (9.32)	.031 (1.32)	.129 (1.34)
MARRIED	.037 (.86)	- .032 (.85)	- .63 (.62)
SOUTH	.049 (1.13)	- .111 (1.92)	- .117 (1.11)
MOTHED	- .0025 (.33)	.0096 (.93)	- .020 (1.21)
IQ	- .0028 (1.68)	- .0069 (2.60)	.0075 (1.67)
NONWHITE	.464 (8.04)	- .322 (3.70)	.357 (2.31)
IC	.212 (2.98)	- .176 (1.73)	- .175 (1.07)
RURAL	.032 (.74)	.082 (1.35)	- .029 (.29)
T	.062 (8.30)	- .013 (1.36)	- .0061 (.32)
YEAR 68	- .025 (1.36)	.020 (.53)	- .039 (.24)
YEAR 69	- .078 (1.10)	.030 (.74)	- .081 (49)
YEAR 70	- .111 (1.55)	.038 (.083)	- .181 (1.08)
YEAR 71	- .093 (1.35)	.033 (.67)	- .294 (1.80)
YEAR 73	- .058 (.79)	.030 (.53)	- .404 (2.39)

TABLE 7

COEFFICIENTS OF FORMAL TRAINING VARIABLES FROM ORDINARY LEAST SQUARES REGRESSIONS ON OLDER MEN'S NLS DATA. DEPENDENT VARIABLE = Ln(WAGE). 4039 Observations. (Absolute Value of Asymptotic t-statistics in Parentheses.)

	Equation A8	Equation A9	Inner-City Effects	Rural Effects
VOCDM	.058	.043	- .034	.118
	(1.62)	(.98)		
VOCYR	.039	.050	.034	.012
	(1.75)	(-1.86)		
VOCDROP	- .011	- .061	- .081	.159
	(.22)	(1.01)		
IC·VOCDM		- .077		
		(.50)		
IC·VOCYR		- .016		
		(.19)		
IC·VOCDROP		- .020		
		(.11)		
RURAL·VOCDM		.075		
		(.93)		
RURAL·VOCYR		- .038		
		(.70)		
RURAL·VOCDROP		.220		
		(1.91)		
COLDM	.027	- .013	- .021	.180
	(.61)	(.25)		
COLYR	.082	.096	.073	.028
	(7.34)	(7.49)		
IC·COLDM		- .0076		
		(.04)		
IC·COLYR		- .023		
		(.45)		
RURAL·COLDM		.193		
		(1.80)		
RURAL·COLYR		- .068		
		(2.36)		

CHAPTER 3

THE ALLOCATION OF TIME TO PRIVATE VOCATIONAL SCHOOL TRAINING

I. Introduction

In this Chapter, I present empirical analyses of time allocation during as well as subsequent to formal training. Two data sources -- the younger men's NLS, discussed in Chapter 2, and the National Longitudinal Study of the 1972 High School Class -- are used to improve understanding of who goes to vocational school and college, of training-period wage effects, and of how policies might be used to induce fewer errors in individuals' training decisions.

Regression results using the NLS data indicate that current vocational schooling significantly raises current wage rates and that persons attending private vocational schools are a relatively disadvantaged group. Results from the 1972 High School data imply that mean reported net direct costs of (full-time-equivalent) private vocational schooling are less than for 2- or 4-year colleges. Also, the length of programs in vocational schools may be more responsive to changes in costs than other training.

The 1972 High School data have so many coding errors and inconsistencies that results obtained from them should be treated as preliminary at best. Nevertheless, results in this chapter complement these in Chapter 2 and help point the way to more appropriate public policies.

Throughout this chapter, the implicit behavioral model is essentially the same as that described in Chapter 2 (and in more detail in Olson 1977). The

only exception is that time allocation equations estimated here contain information on training costs either directly (using the 1972 High School data) or indirectly (using characteristics of individuals).

II. Results From Time Allocation and Wage Equations Estimated on the Young Men's NLS Data

Table 8 presents estimates of the structural equations of a simultaneous system of three time allocation equations and a wage equation. The sample of 13071 is selected by the same rules used for the sample in Chapter 2, except that persons currently in school are included in the sample.

DVOCYR is a truncated, continuous variable measuring current time allocation to private vocational schooling by the difference between $VOCYR_{t+1}$ and $VOCYR_t$. Therefore, a Tobit procedure is used in estimating the DVOCYR equations.[1] About three percent of the observations have positive DVOCYR.

DCOLYR is doubly truncated at zero and unity with unknown intermediate values, so its equations are estimated by a two-limit probit procedure (see Rosett and Nelson 1975 for a discussion of this procedure). Since college data only indicate years completed and whether the individual was enrolled as of each survey, greater precision is infeasible. Coding of DCOLYR is explained in Olson (1976). An individual is coded as intermediate if he was attending college during a period but apparently did not complete a full year. As before, all colleges, even two-year institutions emphasizing vocational curricula, are (of necessity) lumped together in DCOLYR and COLYR. About 30% of the observations have positive DCOLYR, split roughly evenly between intermediate values and unity.

Due to the extraordinary expense of estimating two-limit probits on such a large sample (in an initial attempt, iterations failed to converge in ninety

minutes of computer time) DCOLYR equations are estimated on a one-in-seven sample of the data (every seventh unique ID starting with number seven). A check of the means, minimums and maximums of variables in this subsample and the overall sample showed them to be very similar, so the loss in efficiency is small.

DEXP ($EXP_{t+1} - EXP_t$) and Ln (WAGE) equations are estimated by ordinary least squares. Samples are moderately censored (about five percent were dropped due to zero DEXP and unrecorded wage rates) but this degree of censoring is too small to cause important biases. The use of ordinary least squares may lead to some inefficiency in coefficient estimates or some bias in estimated t-statistics for these equations. However, the efficiency gain from using weighted least squares would not exceed the costs of the added complexity. Coefficient estimates by ordinary least squares are consistent even if inefficient.

The rationale for the estimated structure is explained in Olson (1977), and the use of this type of two-stage, simultaneous system is discussed in Nelson and Olson (forthcoming). As specified, structural time allocation equations depend not on current wage rates but on the whole path of these rates and how that path is affected by time allocation. Current wage rates can, however, depend on current allocation. Time allocation variables are entered into the wage equation in predicted form (hats indicate predicted values) to ensure that coefficients measure effects of time allocation on wages rather than the reverse. Reduced-form time allocation equations (used to predict $\widehat{DVOCYR}$, $\widehat{DCOLYR}$ and $\widehat{DEXP}$, where tildes indicate that specified dependence is on the intensity indexes rather than the truncated variables[2], are estimated on all right-hand-side variables to ensure efficiency.

Coefficients in the structural time allocation equation capture both direct effects (e.g. nonwhites may be more or less effective in learning) and

indirect effects through the wage equation (e.g. discrimination against non-whites). These equations are presented mainly as descriptive vehicles, since they do not correspond to well defined behavioral functions.

Definitions of variables are the same as for Chapter 2. The three new variables are WIFEINC (Wife's income in 1967 dollars), AFYR (Years in the armed forces, proxying GI Bill entitlement), and VET (defined as 1 if AFYR > 0, 0 otherwise).

II.2 Empirical Results

I now turn to a discussion of the results in Table 8. Note that, since T is specified as deviations from its mean, non-T-interacted coefficients apply to youths with the mean number of years (5.5) out of secondary school.

Coefficients in the DVOCYR and DCOLYR equations provide insights into training decisions. WIFEINC and AFYR affect funds availability, and their effects on training are generally positive. In the DCOLYR equation, the negative coefficient of VET combined with the positive coefficient of T.VET indicate a draft effect on college attendance, concentrated in the younger individuals (i.e., non-veterans have an additional reason for attending college -- evading the draft). Negative coefficients on MOTHED and IQ in the DVOCYR equation, combined with positive coefficients in the DCOLYR equations, may refect the emphasis of private vocational schools on market skills, rather than academic subjects. In any event, these coefficients show that youths attending vocational schools have poorer backgrounds and lower IQ's than youths attending college.

Nonwhites and rural youths are significantly less likely to attend college than others, while inner-city youths are more likely. None of these variables significantly affects allocation of time to vocational schooling.

Since these are partial effects, the results imply that once mother's education and IQ are held constant, effects of race and location on vocational school training are no longer significant.

Finally, the generally positive coefficients of the year dummies in the DVOCYR equation, combined with their negative coefficients in the DCOLYR equation, indicate that vocational school attendance increased moderately over the covered period while college attendance decreased slightly.

Coefficients in the DEXP equation are roughly as expected, except for the significantly positive coefficient on wife's income. Since DEXP is in 2000-hour units, coefficients indicate that married respondents work 400 additional yearly hours, nonwhites 150 hours less (possibly due to discrimination), and rural respondents 125 hours more than otherwise similar youths. The negative coefficients on IQ and MOTHED, together with their significantly positive T-interactions, represent an indirect effect of the incentive to attend college early in life.

In the wage equation, the coefficient of $\widehat{DVOCYR}$ is significantly and substantially positive (.374), while the coefficient of $\widehat{DCOLYR}$ is significantly negative (-.103).[3] Evaluating these effects at the antilog of the mean lnWAGE (mean[lnWAGE] = .876; $e^{.876} = 2.40$) a year of current vocational school raises current wages by about \$1.09 ($e^{.876 + .374} = 3.49$) while a year of current college lowers current wages by about \$.23 ($e^{.876 - .103} = 2.17$). Although the estimated vocational school effect is larger here and the estimated college effect is different in sign, these results are qualitatively similar to those in Olson (1977).

Vocational school attendance seems to significantly increase current wages while college attendance may not. This result is consistent with the idea that the flexibility of vocational schools facilitates market work while training. The schools may also provide or find jobs for their students. This

effect would help explain why persons with poor backgrounds and low IQ's train in private vocational schools despite relatively high tuition charges. Vocational students appear to be self-financing much of their schooling cost by working. Given their probable borrowing constraints, this course of action seems reasonable.

The training stock variables are entered in the wage equation with IC interactions but without RURAL interactions, in accord with the reults of Chapter 2, Appendix 2. While most estimated coefficients of the stocks of training are statistically significant, the coefficients look a bit unstable. This difficulty presumably arises from mixing young men in and out of school, since wage structures may differ for the two groups. Mixing the groups should give reliable estimates of the effect of current training on wages, but fine distinctions in effects of previous training may not be accurately estimated.[4] Therefore, the reader is encouraged to rely on the results in Chapter 2, where only persons out of school are included, to assess training returns. Note that most of the qualitative results are similar in Tables 2 and 8; dropping out pays for non-IC youths but is disastrous for IC youths and the effect of VOCYR is negative for all students.

Note also that being raised in a rural area leads to substantially lower wages as an adult, while inner-city youths have relatively high wages given their characteristics. Part, but not all, of this difference is presumably due to cost-of-living differences in the places of current residence.

III. Results Estimated on the National Longitudinal Study of the 1972 High School Class

The National Longitudinal Study of the High School Class of 1972 (hereinafter HS72) was chosen for the current study because of its large sample size (more than 22,000 respondents), and because it contains specific data on direct costs of training and on sources of funds. Therefore, it was believed that these data would allow generation of specific policy prescriptions with respect to loans, grants, and other government-affected policy instruments.

I report statistical calculations derived from the HS72 data but, unfortunately, I cannot recommend that these results be used for making policy. The HS72 data were collected using self-administered questionnaires, and the public use tapes were provided in an uncleaned, nearly undecipherable form. For this study, my staff and I spent months of our time and well over $1000 in computer costs just getting these data into a semi-useable format. In the end we pulled back to only using the first follow-up year and throwing out nearly all questionable data but, short of making copies of my computer programs available, there is no way I can provide sufficient information here even to allow replication of my results. So, while results are reported here, the reader is urged not to take them as conclusive. Further, I cannot recommend use of these data for other studies until a properly cleaned set of public use tapes is made available by the National Center for Education Statistics.

It is fortunate, therefore, that the returns results in Chapter 2 are so stark. They indicate that government policies should differentially encourage very short vocational school programs (especially for inner-city youths) and long college programs. For instance, governments could subsidize more than the complete direct costs for individuals completing private vocational school programs of less than six (full time equivalent) months. Dropouts and

persons taking programs of six months or more could receive reduced subsidies. For college, governments could make receipt of subsidy conditional on completion of at least two years. One hardly needs to do a detailed statistical analysis of current policies to realize that they bear little resemblance to this model.

III.I Data Preparation

In preparing the data, I generally discarded any observation with incomplete information on the input data used to construct the time allocation and wage variables, although missing hours of training per week were sometimes replaced by means over all positive values. I used the fact that data on attendance at 2 (JUN) and 4 (COL) year colleges are reported separately and that hours per week are given for college to form separate and potentially precise variables. All are coded in full-time college years (39 weeks at the mean of the college hour values exceeding 10, viz. 18.3). However, even for observations with complete data, the necessity of building time allocation variables from starting time and stopping time data introduces unavoidable coding errors. An indication of dropping out was provided only for the middle school (not attended in October 1972 or October 1973), so VOCDROP contains fairly serious errors (biasing the number of ones downward.) I discarded all observations on females (for comparability) and all with incomplete data on other included variables except MOTHED (for which missing values were replaced with the global mean, 11.8).

The resulting sample has only 6452 observations but these data are reasonably clean. I cannot really tell whether they are representative of the whole sample because of missing data. Wage rates are computed as a weighted average of weekly earnings divided by weekly hours, weighted by the proportion of the year worked on the starting and ending jobs (other job information is unavailable). DEXP is coded as a similarly weighted sum of weekly hours divided by 2000. In both cases, overlaps are allowed.

The variables used in Tables 9-13 are coded to be as similar as possible to those for the other two data sets. EXPHS is usual hours worked per week in the last high school year times 39/2000. WIFEINC is set to zero for unmarried respondents. MOTHED is coded from the categories in the data (viz. 1 = 8, 2 = 12, 3 = 14, 4 = 16, 5 = 18). ABILITY is the simple sum of the vocabulary, reading, letter groups and mathematics tests given in the base year all divided by 2 to give a mean of 100. This variable is used as if it were an IQ measure (its standard deviation over observations with non-missing wage rates is 16.6). The inner-city variable, IC, is coded a unity if the individual lives in a central city of at least 50,000 and has less than the mean "socio-economic status raw score". RURAL and IC have different meanings have than in the two NLS data sets, because (of necessity) they refer to current location.

The availability of information on training costs and funding motivated choice of the HS72 data. For simplicity, I created a total aid variable by summing scholarships, grants, and other non-family aid over all sources. I also made a similar loan variable. I then created VPRICE as (tuition + books + transportation - total aid)/(VOCYR + JUNYR + COLYR) if VOCYR > 0, 0 otherwise.[5] VLOAN was defined as (total loans)/(VOCYR + JUNYR + COLYR) if VOCYR > 0, 0 otherwise. JPRICE, JLOAN, CPRICE and CLOAN were coded similarly. These variables measure net direct costs and loans per full-time college year and are therefore comparable. Notice that they are zero for each training type if none of that training was taken and that they are the same for all training types for the few individuals who took more than one type between October 1972 and October 1973.

III.3 Empirical Results

Table 9 contains mean levels of the variables in my HS72 sample and in various subsamples. Notice that respondents with positive VOCYR train slightly

more than persons attending 2- or 4-year colleges while also working more. In fact, vocational students work slightly more than the average respondent. These findings support the idea that vocational students self-finance their training by working. Notice that vocational school training has the lowest net price per college equivalent year, a difference presumably due to smaller room and board costs. Notice also that the data problems (detailed above) for the dropout variable render it nearly meaningless for inference.

Table 10 contains estimated structural equations for current time allocation and wages. Tables 11 and 12 contain similar equations (deleting IC and RURAL) for inner-city and rural youths. VOCYR, JUNYR and COLYR equations are estimated by ordinary least squares on only those observations with positive values of the dependent variables, because the price and loan variables are meaningful only for these values. WORK equations are estimated using a Tobit procedure. These equations are then used to create $\widehat{\text{VOCYR}}$, $\widehat{\text{COLYR}}$, $\widehat{\text{JUNYR}}$, and $\widehat{\widehat{\text{WORK}}}$ for input into the wage equations. The ln(WAGE) equations are then estimated by ordinary least squares on all observations with non-missing wage rates.[6]

All estimated coefficients on price variables are negative, an encouraging result since it implies that demand curves for each type of training are negatively sloped.[7] The estimated negative effects are three to four times as large for vocational school training as for either type of college, implying that demand for vocational school may be relatively responsive to price. Loan coefficients take both signs and are seldom statistically significant. This result is not surprising, because loans increase welfare only if they are subsidized and because loan amounts may proxy difficulties in raising cash to finance training costs.

Attempts to use these results to motivate policy are frustrated both by the poor quality of the data and by the lack of price and loan data for

persons not taking training. The latter problem precludes separate estimates of effects of costs on the probability of taking training and the amount taken. As indicated in Chapter 2, this distinction is particularly important for vocational school. However, the relatively large negative own-price effects on VOCYR may imply that programs to decrease initial cost and increase marginal cost could induce more suitable training choices. It seems appropriate to implement such programs.

Looking at the coefficients of IC and RURAL in Table 10, notice that 1) None of the IC coefficients is significant implying that, once other variables are held constant, currently being inner-city has no effect on formal training choices, 2) Rural youths take substantially (but not significantly) more vocational school and significantly more junior college training than otherwise similar individuals, 3) both inner-city and rural youths work more than their counterparts, and 4) the negative rural effect on wage rates persists (significant at the 10% level) in these data which use current location.

In the wage equations, none of the effects of predicted time allocation on current wage rates is significant at the 5% level. This finding is at variance with the results reported in Table 8. Given the problems with the HS72 data and the poor fit of the wage equations in Tables 10-12 (R^2 = .02, .03, and .01 respectively), the results obtained from the NLS data (see Table 8) are more trustworthy. The wage equations in Tables 10-12 fit the data so badly that one cannot even tell whether they represent the same or different structures. The other equations, particularly for work time, do appear different for inner-city, rural and other youths.

Summarizing, coefficients estimated on the HS72 data are broadly sensible but probably not reliable. Results indicate that amounts of all types of training respond negatively to increases in their costs or decreases in aid.

These responses may be largest among students attending private vocational schools Reported net direct costs are also lowest for private vocational students. Attempts to draw more precise conclusions or conclusions on effects other than own-price effects from these data would be inappropriate. Instead, the best strategy is to use the policy prescriptions generated directly from returns results in Chapter 2.

IV. Summary and Conclusion

This chapter uses equations fit to two data sets to analyze time allocation decisions of persons in and out of formal training. The mixing of trainees with non-trainees causes some difficulties with poorly fitting wage equations, but the broad sweep of results is consistent with the findings reported in Chapter 2.

The principal results reported in this chapter are that 1) persons attending private vocational schools are a relatively disadvantaged, low ability group, 2) vocational schooling appears to raise wage rates in the period in which it is taken (not all the evidence supports this conclusion but I think it correct), 3) reported mean net costs of (full-time-equivalent) vocational schooling are lower than those of 2- or 4-year colleges, 4) the length of vocational schooling chosen may be more responsive to its net costs than 2- or 4-year college programs and 5) inner-city and rural effects on training choices appear relatively weak once other characteristics are accounted for.

These results corroborate and augment the findings of Chapter 2, implying that private vocational schools are an important source of skill

formation for their relatively disadvantaged students. These results support a policy of differential subsidies to encourage attendance at private vocational schools and completion of programs while discouraging signing up for programs more than six full-time-equivalent months long.

My findings are not sufficiently precise to allow quantitative predictions of the effect of such differential policies. They do, however, imply that appropriate policies can have useful qualitative effects on training choices.

Given the starkness of the results in Chapter 2, qualitative support should be sufficient to encourage prompt implementation of differential subsidies. More precise estimates await better data. In the interim, improved policies can do a lot of good, particularly in lowering dropout rates among inner-city youths attending private vocational schools.

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FOOTNOTES

1. As stated in Chapter 2, use of a Tobit procedure requires that the probability of any training and the amount taken lie along an intensity index continuum. The model in this chapter deals with current training rather than total cumulative training, however, so the forms may differ. In Olson (1977), which used a specification similar to the one in this chapter on the NLS data up to 1969, I ran separate probability and length equations for current vocational schooling as a test of the Tobit restrictions. The signs of all significant coefficients except NONWHITE (significantly negative on probability, insignificantly positive on length) were the same in both equations.

2. The effect of specifying dependence in this manner and possible justifications for it are discussed in Nelson and Olson (forthcoming).

3. In Olson (1977), I also estimated a wage equation on actual current time allocation to check the simultaneous specification. Coefficients of all three time allocation variables revised sign, indicating pervasive simultaneity in the system. This finding supports the specification used here.

4. The estimated wage equation is linear rather than piecewise-linear, because additional complexity seems inappropriate in this chapter.

5. Total costs of training should, in principle, be measured in opportunity cost terms -- including foregone earnings and excluding any direct costs that would be borne whether or not the person attended school (eg. board). The measure used is conventional and there is no obvious way to bring it into line with theory. Some information on foregone earnings is contained in the $\widehat{\text{DVOCYR}}$ and $\widehat{\text{DCOLYR}}$ coefficients of Table 8.

6. As noted in Chapter 2, estimating on only the positive or non-missing values may yield biased coefficients. However, biases are expected to be small and no other simple method of estimation is available.

7. Note that there is a possible source of downward bias in the PRICE and LOAN coefficients. Eg., consider the vocational school equation for a person who only attended vocational school. His dependent variable is VOCYR while his VLOAN variable is (total loans)/VOCYR. Therefore, errors in measurement in coding of VOCYR could impart a negative bias to the VLOAN coefficient. Similar statements apply to coefficients in the JUNYR and COLYR equations

TABLE 8

ESTIMATED STRUCTURAL EQUATIONS FOR TRAINING AND WORK DECISIONS FIT TO NLS DATA

(Absolute Value of Asymptotic t-statistics in Parentheses) 13071 Observations.

Dependent Variable	DVOCYR		DCOLYR		DEXP		Ln (WAGE)	
CONSTANT	-2.76		-40.88		1.41		-3.73	
$\widehat{DVOCYR}$							.374	(3.18)
$\widehat{DCOLYR}$							- .103	(2.64)
$\widehat{DEXP}$							1.42	(1.63)
VOCDM							- .362	(2.80)
VOCYR							- .102	(3.13)
VOCDROP							.252	(2.79)
IC.VOCDM							.435	(3.09)
IC.VOCYR							- .144	(1.94)
IC.VOCDROP							- .629	(2.42)
COLDM							.102	(2.52)
COLYR							.013	(.97)
IC.COLDM							- .104	(1.19)
IC.COLYR							.070	(2.51)
EXP							- .174	(1.42)
EXP^2							.011	(1.52)
SECSCH	.138	(5.85)	3.12	(4.16)	- .0066	(3.23)	.277	(3.12)
MARRIED	- .026	(.47)	-1.17	(8.86)	.201	(28.62)	- .067	(.52)
WIFEINC	.000026	(1.99)	.000099	(3.21)	.0000029	(1.54)		
AFYR	.052	(2.07)	- .015	(.13)				
VET			-1.08	(3.32)				
SOUTH	- .033	(.66)	.163	(1.36)	- .0067	(1.01)	- .144	(9.76)
MOTHED	- .025	(2.91)	.063	(3.19)	- .0094	(8.46)	.018	(3.30)
IQ	- .0059	(3.41)	.030	(6.98)	- .0037	(15.21)	.0072	(2.95)
NONWHITE	- .096	(1.54)	- .463	(2.27)	- .074	(9.34)	- .092	(2.27)
IC	- .059	(.64)	.623	(2.49)	- .0087	(.75)	.146	(2.92)
RURAL	.046	(.93)	- .578	(4.49)	.062	(9.03)	- .196	(4.14)
T	- .216	(2.08)	4.47	(2.75)	- .077	(6.40)	.454	(2.27)
T.SECSCH	.0075	(.91)	- .370	(2.74)	.0025	(3.31)	- .025	(2.27)
T.MARRIED	.068	(3.92)	.194	(4.51)	- .032	(14.27)	.012	(.64)
T.VET			.177	(2.63)				
T.SOUTH	- .014	(.89)	- .034	(.81)	.011	(4.83)	.0028	(.36)
T.MOTHED	- .0031	(1.12)	- .0034	(.51)	.0025	(6.59)	- .0013	(.60)
T.IQ	.0010	(1.86)	- .0024	(1.53)	.00064	(7.65)	- .0010	(1.56)
T.NONWHITE	.0012	(.06)	.051	(.66)	- .00047	(.18)	- .022	(3.15)
T.IC	.00051	(.02)	.104	(1.35)	- .0047	(1.23)	.029	(2.54)
T.RURAL	- .024	(1.55)	.070	(1.66)	- .0038	(1.68)	.014	(2.10)
YEAR 68	.076	(.93)	- .084	(.47)	- .026	(2.43)	.101	(2.29)
YEAR 69	.083	(1.02)	- .218	(1.22)	- .032	(3.13)	.126	(2.38)
YEAR 70	.247	(3.17)	- .412	(2.29)	.012	(1.14)	.026	(.99)
YEAR 71	- .068	(.78)	- .521	(2.87)	- .0085	(.81)	.178	(2.90)
YEAR 73	.302	(3.72)	- .209	(1.15)	.028	(2.58)	.101	(3.22)
STD. ERROR	.970		1.42		.335		.466	

TABLE 9

MEAN LEVELS OF HS72 VARIABLES FOR THE SAMPLE AND VARIOUS SUBSAMPLES

	All Observations	IC = 1	RURAL = 1	VOCYR> 0	JUNYR> 0	COLYR> 0	WORK> 0
N	6452	948	2596	340	918	1800	3869
VOCYR	.054	.056	.064	1.02	.022	.011	.061
VOCDROP	.014	.018	.018	.059	.004	.002	.019
JUNYR	.105	.114	.107	.045	.737	.034	.116
COLYR	.243	.178	.245	.055	.089	.870	.160
WORK	.422	.524	.505	.458	.370	.186	.704
WAGE*	2.88	2.91	2.88	2.81	2.65	2.54	2.88
EXPHS	.313	.322	.314	.348	.294	.239	.344
WIFEINC	55.91	78.22	73.22	52.78	32.27	16.10	86.79
MOTHED	11.77	10.18	11.58	11.80	12.30	12.89	11.59
ABILITY	100.24	94.06	99.83	99.07	104.13	112.66	99.07
NONWHITE	.114	.274	.086	.094	.072	.081	.108
IC	.147	1	0	.168	.157	.112	.177
RURAL	.402	0	1	.447	.388	.402	.456
AGE	19.57	19.71	19.60	19.57	19.48	19.42	19.61
LOAN	-	-	-	172.50	108.96	267.21	-
PRICE	-	-	-	760.05	945.99	1227.30	-

*Wage means are over non-missing observations only

TABLE 10

ESTIMATED STRUCTURAL EQUATIONS FOR TRAINING AND WORK DECISIONS FIT TO HS72 DATA
(Absolute Value of Asymptotic t-statistics in Parentheses) All Observations.

	VOCYR	JUNYR	COLYR	WORK	ln(WAGE)
N	340	918	1800	6452	.3869
CONSTANT	5.01	1.31	.476	.863	.384
$\widehat{VOCYR}$					.072
					(.61)
$\widehat{JUNYR}$					.148
					(1.38)
$\widehat{COLYR}$					.141
					(1.16)
$\widehat{\widehat{WORK}}$					.317
					(1.69)
EXPHS	.210	- .052	- .064	.488	- .034
	(1.22)	(.80)	(1.69)	(14.07)	(1.30)
WIFEINC	- .00017	- .000032	- .000050	.00013	
	(1.43)	(.72)	(1.26)	(6.95)	
MOTHED	.027	- .0033	- .0024	- .010	- .0022
	(1.52)	(.49)	(.67)	(2.84)	(.68)
ABILITY	- .0017	- .0014	.0042	- .0054	- .00035
	(.50)	(1.10)	(5.42)	(8.54)	(.28)
NONWHITE	- .269	.018	.015	- .164	.022
	(1.66)	(.28)	(.42)	(5.24)	(.35)
IC	.071	.025	-.029	.310	- .104
	(.52)	(.49)	(.92)	(10.94)	(1.52)
RURAL	.161	.081	.013	.287	- .131
	(1.61)	(2.28)	(.70)	(14.30)	(1.77)
AGE	- .213	- .018	.0020	- .014	.017
	(2.44)	(.54)	(.09)	(1.00)	(.58)
LOAN	.00000050	- .000047	- .000022		
	(.01)	(2.48)	(2.47)		
PRICE	- .00011	- .000054	- .000054		
	(3.84)	(7.77)	(11.31)		
Standard ERROR	.800	.488	.377	.675	.385

TABLE 11

ESTIMATED STRUCTURAL EQUATIONS FOR TRAINING AND WORK DECISIONS FIT TO HS72 DATA
(Absolute Value of Asymptotic t-statistics in Parentheses)
Inner-City Observations.

	VOCYR	JUNYR	COLYR	WORK	ln(WAGE)
N	57	144	202	948	683
CONSTANT	9.04	2.01	- 1.55	.157	1.39
$\widehat{VOCYR}$					- .128 (.45)
$\widehat{JUNYR}$					.357 (1.86)
$\widehat{COLYR}$					.345 (.93)
$\widehat{WORK}$					.955 (1.23)
EXPHS	- .493 (1.17)	.037 (.23)	- .105 (1.01)	.411 (5.64)	- .384 (1.57)
WIFEINC	- .00018 (1.14)	- .000047 (.47)	- .00024 (.67)	.00014 (3.94)	
MOTHED	.040 (.82)	.010 (.51)	.0046 (.38)	- .0086 (.95)	.0013 (.12)
ABILITY	- .0097 (1.27)	- .0037 (1.20)	.0058 (2.68)	- .0059 (4.19)	- .0022 (.38)
NONWHITE	- .412 (1.51)	.00021 (.00)	.072 (.98)	- .107 (2.18)	- .036 (.21)
AGE	- .369 (1.75)	- .049 (.59)	.091 (1.56)	.040 (1.24)	- .067 (.61)
LOAN	.0000020 (.01)	- .000052 (1.63)	- .0000085 (.34)		
PRICE	- .00016 (1.45)	- .000068 (3.47)	- .000045 (2.91)		
STANDARD ERROR	.712	.496	.381	.588	.375

TABLE 12

ESTIMATED STRUCTURAL EQUATIONS FOR TRAINING AND WORK DECISIONS FIT TO HS72 DATA
(Absolute Value of Aymptotic t-statistics in Parentheses) Rural Observations.

	VOCYR	JUNYR	COLYR	WORK	ln(WAGE)
N	152	356	723	2596	1764
CONSTANT	4.21	- .297	.117	1.88	1.03
$\widehat{VOCYR}$					- .0017 (.01)
$\widehat{JUNYR}$					.146 (.90)
$\widehat{COLYR}$					- .111 (.57)
$\widehat{WORK}$					.214 (.40)
EXPHS	.305 (1.11)	- .035 (.35)	- .003 (.37)	.518 (10.25)	- .014 (.05)
WIFEINC	- .00011 (.54)	- .00017 (1.03)	- .000073 (1.28)	.000072 (2.89)	
MOTHED	.050 (1.82)	- .012 (1.19)	- .0029 (.53)	- .030 (5.80)	.0076 (.46)
ABILITY	.0041 (.70)	.0013 (.64)	.0025 (2.03)	- .0091 (9.75)	.00056 (.13)
NONWHITE	- .275 (1.02)	- .021 (.15)	.044 (.70)	- .177 (3.54)	- .045 (.37)
AGE	- .206 (1.45)	.059 (1.06)	.031 (.88)	- .021 (.91)	- .015 (.39)
LOAN	- .000087 (.90)	- .000037 (1.50)	- .000035 (2.06)		
PRICE	- .00017 (3.12)	- .000047 (4.58)	- .000058 (8.17)		
STANDARD ERROR	.843	.475	.378	.639	.393

CHAPTER 4

CONCLUSIONS

The goals of this project were 1) to increase understanding of decisions involving private post-secondary vocational schooling and 2) to indicate useful directions for public policy with special attention to dropouts and inner-city and rural youths. These rather ambitious goals seem largely to have been met, although not in the form originally anticipated.

The project encountered severe data problems, particularly with respect to the HS72 data. Yet the returns results in Chapter 2 were so stark that the broad outlines of an improved public policy can nonetheless be sketched.

In Chapter 2, I found that initial increments of private vocational schooling seem to raise subsequent wage rates substantially (20% for inner-city youths, 11% for others) but that additional increments have an apparent negative effect. While various estimation biases could have contributed to this result, it is unlikely that returns to one-year (full-time) programs in these schools are sufficiently greater than returns to three-month programs to cover the added costs.

Estimated dropout penalties are very small for all but inner-city students in these schools (in particular penalties are small for rural students), so the high observed dropout rates in the schools could be due to the students gaining understanding of the form of returns. These results point out obvious directions for both public policy and future research.

It is unfortunate that my data did not allow comparison of private vocational schools with their public counterparts and that no useful breakdown of private vocational programs by type are available. Future research

should concentrate on answers to these questions, once the required data become available.

However, given the starkness of my findings, it seems unnecessary to wait for more research before implementing new policies. Governments and the private vocational schools could begin immediately to emphasize short vocational programs, particularly for inner-city youths. This end can be achieved by publicizing the advantages of short private vocational school programs and by differentially subsidizing short programs.

A reasonable objective of policy could be to channel vocational trainees into (full-time equivalent) programs of less than six months or even less than three months. Large subsidies (exceeding total direct costs) to persons completing short programs coupled with penalties for dropping out and reduced subsidies to persons taking programs of six months or more would go a considerable distance toward reaching this objective.

Policies similar to these might yield large social dividends. The private vocational schools already serve a relatively disadvantaged group of young men. Therefore, any improvement in their effects will increase aggregate income while also moving the distribution of income toward equality.

Improved policies would be especially helpful for inner-city youths, since they are heavy users of the private vocational schools and since even small decreases in their dropout rates could yield large benefits to them. Rural youths would have a better vehicle for evading the large wage differentials between them and corresponding non-rural youths. Overall, a great deal of waste from signing up for long vocational programs and then dropping out could be averted if students had better information and if incentives were altered to help induce students to make more accurate training choices.